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SYNOPSIS OF THE GEOMYIDÆ.[1]

BY DR. ELLIOTT COUES, U. S. A.

FAMILY GEOMYIDÆ.

The presence of enormous external cheek-pouches, unconnected with the mouth, distinguishes this family of rodents from others excepting its nearest allies, *Saccomyidæ;* which latter, sharing the pouches, differ in the comparative length of the fore and hind limbs, the great length of the tail, size of the eyes and ears, and non-fossorial character of the fore feet. There are numerous and more important anatomical characters, especially in the skulls. The family *Geomyidæ*, equivalent to the *Sciuro-spalacoïdes* of Brandt, and to the subfamily *Geomyinæ* of Baird, consists of two genera, *Geomys* and *Thomomys*, readily distinguished as follows:

Geomys. Superior incisors with a deep groove near the middle, with or without a second fine groove along the inner margin. Claws of fore feet enormously developed. External ears obsolete.

Thomomys. Superior incisors without a central groove, but with a fine groove along the inner margin. Fore claws weaker. External ears distinct.

Geomys has become fairly differentiated into a considerable number of species, while of *Thomomys* all the species hitherto described may be reduced to one, with three marked geographical races, the intergradation between which is still complete. All the described species of both genera are accounted for in the following pages, excepting one, recently published by Peters (*Monatsb. Acad. Wissen.* Berlin, 1864, p. 177), which I have not seen.

I. Genus **GEOMYS** (ex Raf.).

Mus, sp., Shaw et al., l. c. infra.
Cricetus, sp., Desm. et al., l. c. infra.
Geomys, Raf., Am. Month. Mag. ii. 1817, 45.
Diplostoma, Raf., op. loc. cit. ; charact. plerumq. inept. Nec Rich.
Saccophorus, Kuhl, Beit. 1820, 65.
Pseudostoma, Say, Long's Exp. R. Mts. 1823, 406.
Ascomys, Licht. Abh. Acad. Berl. für 1822–'3, 1825, 20.

[1] This paper is an abstract of results reached in a protracted study of the family, based upon the material in the National Museum, Smithsonian Institution, Washington, D. C. The extended memoir will be published elsewhere.

Analysis of Species.

A. Superior incisors bisulcate; fore claws enormous; pouches very large.
   a. Upper incisors almost exactly bisected by the large groove, with the fine marginal groove distinct; tail and feet hairy. . . *bursarius.*
   b. Upper incisors divided by the main groove into two unequal portions, of which the inner is the larger, and the fine groove faint or obsolete; tail and feet nearly naked. . . . . *tuza.*

B. Superior incisors unisulcate; fore claws and pouches smaller.
   c. Superior incisors exactly bisected; fur soft; tail and feet hairy.
      e. Smaller; yellowish-brown; below whitish. . . *castanops.*
      f. Larger; dark reddish-brown; below plumbeous. . *mexicanus.*
   d. Superior incisors unequally divided by the groove into a smaller inner, and larger outer moiety; pelage hirsute; tail and feet nearly naked. . . . . *hirsutus.*

1. **Geomys bursarius** (Shaw), Rich.

Mus bursarius,[1] Shaw, Linn. Tr. v. 1800, 227, f. 8; G. Z. ii. 1801, 100, pl. 138.
Cricetus bursareus, Desm., Mamm. ii. 1822, 312.
Saccophorus bursarius, Kuhl, Beit. 1820, 65.
Pseudostoma bursaria, Say, Long's Exp. R. Mts. i. 1823, 406.—Aud. and Bach., Q. N. A. i. 1849, 332, pl. 44.
Geomys? bursarius, Rich., F. B. A. i. 1829, 203.
Ascomys bursarius, Eyd. and Gerv., Voy. Favorite, v. 1839, 23.
Geomys (*Saccophorus*) *bursarius*, Gieb., Säug. 1855, 529.
Geomys bursarius, Bd., M. N. A. 1857, 372, pl. 22, fig. 1 a-h, pl. 50, fig. 2 a-g, and of most late writers.—Leidy, these Proceedings, 1867, 97 (Loess of Missouri).
? Mus ludovicianus, Ord., Guthrie's Geog. 2d Am. ed. ii. 1815, 292.
? Diplostoma fusca, Raf., Am. Month. Mag. ii. 1817, 44.
? Diplostoma alba, Raf., l. c.
Saccophorus? albus, Fisch., Syn. 1827, 305.
? Geomys cinereus, Raf., op. cit. 45.
Mus saccatus, Mitch., N. Y. Med. Repos. xxi. 1821, 249.
Ascomys canadensis, Licht., Abh. Acad. Wiss. Berl. 1823, 13, fig.
Geomys canadensis, Le C., these Proceedings, 1852, 158.
? Geomys drummondii, Rich., Rep. Brit. Assoc. for 1836, v. 1837, 157 (sp. indet. dentibus prim. bisulcatis).
? Ascomys drummondii, Wagn. Suppl. Schreber.
Geomys oregonensis, Le C., op. cit. 160 (assigned locality erroneous).
Geomys breviceps, Baird, these Proceedings, 1855, 334; M. N. A. 1857, 378, pl. 52, fig. 2 a-g.

[1] Only the original references, with a few of the principal additional ones, are given here; the complete bibliography will appear elsewhere.

Canada Rat, Shaw, l. c.—*Canada Pouched Rat*, Rich., l. c.—*Hamster du Canada*, Desm. l. c.—*Canadian Hamster*, Griffith, A. K. v. 1827, 235.—*Pseudostome a bourse*, Less., Man. 1827, 259.—*Diplostome brun*, *D. blanche*, Desm., Less., ll. cc.—*Goffer*, *Taschenmaus*, Schinz, Syn. ii. 1845, 132. *Gauffre*, *French Canadian* (whence German "Goffer" and English "Gopher").—*Pouched Rat*, *Sand Rat*, *Gopher*, *Pocket Gopher*, *Salamander*, American *Vulgo*.

Diag.[1] Superior incisors bisulcate, with a fine sharp groove along the inner margin, and another much larger bisecting the remaining plane surface. Cheek pouches ample, extending to the shoulders; hands (including claws) longer than the feet; tail and feet hairy; pelage soft, sleek, mole-like. Color dull reddish-brown, beneath muddy or hoary gray, the basal portion of the fur everywhere plumbeous; feet and tail for the most part white or colorless. Varies to a uniform plumbago color. Average dimensions, adult 7–8 inches; tail 2–3 inches; fore foot, with longest claw, about 1.50; hind do, 1.25; longest fore claw about 0.75.

Hab. Valley of the Mississippi, in a broad sense, and somewhat beyond to the northward. "Canada." "Oregon."(???)

2. **Geomys tuza** (Ord), Coues.

Hamster of Georgia, Mitch., N. Y. Med. Repos. v. 1802, 89; Bewick's Quad. 1st Am. ed. 1804, 525.

Mus tuza,[2] Ord, Guthrie's Geog., 2d Am. ed. ii. 1815, 292.

Geomys pinetis, Raf., Am. Month. Mag. ii. 1817, 45 (Georgia).—Baird, M. N. A. 1857, 380, pl. 22, fig. 3 a–e.

Saccophorus? pineti, Fisch., Syn. 1829, 305.

Geomys pineti, Le C., these Proceedings, 1852, 159.

Pseudostoma floridana, Aud. & Bach., Q. N. A. iii. 1853, 242, pl. 150, fig. 1.

Geomys des pins, Desm., Mamm. ii. 1822, 314.

Southern Pouched Rat, *Gopher*, *Salamander*, Vulg.

Diag. Superior incisors with a main groove dividing the tooth into two unequal portions, the outer obviously the smaller; the inner larger moiety marked by a fine marginal groove, faint, obscure, and perhaps sometimes obsolete. Tail and hind feet in adult life naked or nearly so. Otherwise like *G. bursarius*.

Hab. Georgia, Florida, and Alabama.

[1] Detailed descriptions, discussions, and synonymy, and all general matters, are deferred.

[2] N. B.—Ord's *Mus tuza*, l. c., quoted with a query by Baird, unquestionably belongs to this species, being based solely on Mitchell's "Hamster of Georgia;" and antedates Rafinesque's name.

Geomys castanops (Baird), Le C.

Pseudostoma castanops, Bd., Stansbury's Rep. G. S. L. 1852, 313.—Aud. & Bach., Q. N. A. iii. 1854, 304.

Geomys castanops, Bd., these Proceedings, 1852, 163; Baird, M. N. A. 1857, 381; P. R. R. Rep. x. 1859, Gunnison & Beckwith's Route, mammals, 8, pl. 10, f. 2.

Geomys clarkii, Baird, these Proceedings, 1855, 332; M. N. A. 1857, 383, pl. 50, figs. a–g.

Chestnut-faced and Pecos Gopher, Baird, ll. cc.

Diag. Superior incisors with a single median groove exactly bisecting the face of the tooth. Forefeet shorter or not longer than the hinder. Color pale yellowish-brown above, inclining more or less to dull chestnut anteriorly, whitish below; size of *G. bursarius*, or rather less. Fur soft, as usual in the genus.

Hab. Texas and New Mexico.

4. **Geomys mexicanus** (Licht.), Le C.

Ascomys mexicanus, Licht., Abh. Acad. Wiss. Berl. 1827, 113.

Saccophorus mexicanus, Fisch., Syn. 1829, 305.

Geomys mexicanus, Le C., these Proceedings, 1852, 160.—Baird, M. N. A. 1857, 387.

Pseudostoma (*Geomys*) *mexicana*, Aud. & Bach., Q. N. A. iii. 1854, 309.

Geomys (*Saccophorus*) *mexicanus*, Gieb., Säug. 1855, 529.

? *Tucan* of Hernandez.—*Tuça* or *Tuza*, Mexican.

Diag. Superior incisors bisected by a single median groove (as in *castanops*, which is very different in color). Coloration and general appearance of *G. bursarius* (which has bisulcate incisors). Fur soft and sleek (as in other species of the genus excepting *G. hispidus*). Averaging much larger than either of the United States species (about equalling *G. hispidus*), with proportionally smaller pouches and hands, and weaker claws. Tail and feet hairy (as is usual in the genus, not as in *G. tuza* or *G. hispidus*).

Hab. Mexico. (Limits of its distribution not known.)

5. **Geomys hispidus**, Le C.

Geomys hispidus, Le C., these Proceedings, 1852, 158.—Baird, M. N. A. 1857, 386, pl. 22, f. 4 a-d.

Pseudostoma (*Geomys*) *hispidus*, Aud. & Bach., Q. N. A. iii. 1854, 306.

Saccophorus quachil,[1] Gray, P. Z. S. xi. 1843, 79 (Coban, Centr. Am.; descr. nulla.).—Gerr., Cat. Bones Br. Mus. 1862, 223.

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[1] I do not find that this species, named in 1843, was ever described. Desiring to find out what it was, I wrote to Mr. R. B. Sharpe of the British

Diag. Superior incisors with a single strong deep groove lying wholly in the inner half of the tooth. Tail and hind feet naked or nearly so. Forefeet, including claws, decidedly shorter than the hind feet. Pouches moderate, reaching scarcely or not beyond the head. Pelage peculiarly stiff, harsh, coarse and nearly lustreless. Color uniform dull chocolate-brown, merely paler below. Of largest size; upward of a foot long; tail only about 3 inches; sole of hind foot 1.66.

Hab. Parts of Mexico, and Central America.

II. Genus **THOMOMYS**, Maxim.

Oryctomys, pt., Eyd. and Gerv., Mag. Zool. vi. 1836, 23.
Thomomys, Maxim., N. Act. Ac. C. L. xix. 1839, 383.

In addition to the foregoing, all the synonyms of *Geomys* (*q. v.*) have been applied to species of this genus.

It is impossible to diagnosticate more than two species of this genus. The expressions used, therefore, to distinguish the three intergrading geographical races of *T. talpoides*, in the following analysis, must be understood to indicate only the normal average of the three forms, perfectly intermediate examples of each of which are found.

Analysis of Species.

A. Large; adults at least six inches long, usually more. Hind foot an inch or more long. Tail at least one-third as long as head and body. Above brown, reddish, etc, ; below gray, brown, reddish, etc. (not white). Ears set in a blackish area. 1. TALPOIDES.

a'. Six or eight inches long. Fore claws highly developed (0.45–0.50 long) causing the hand to about equal the foot in length. Color of the house rat, with white tail and feet; usually white about the mouth. Northern Interior. *a. talpoides.*

b'. Seven to nine inches long; fore claws less developed, usually under 0.50, leaving the hand shorter than the foot; reddish-brown, the belly muddy brownish; tail and feet usually not entirely white; mouth-parts dark, contrasting with the white of the pouches. Pacific coast, U. S. *b. bulbivorus.*

c'. Averaging smaller; usually six to seven inches long. Fore claws about 0.40 long, leaving the hand decidedly shorter than

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Museum, who, with his usual courtesy, examined Gray's type for me, and found it to agree exactly with the diagnosis I sent him of *G. hispidus*. In this identification he is supported by Mr. Gerrard, who examined the original specimen with him.

the foot. Rich fulvous, or even fawn-color, similar below but paler, variously obscured on the back with dusky ; tail and feet usually dark ; face and mouth-parts sooty-blackish, strongly contrasting with white pouch lining. Southern Interior and lower California. *c. umbrinus.*

B. Small ; decidedly less than six inches long. Hind foot less than an inch, fore foot still less. Tail scarcely one-fourth as long as head and body. Above, pale yellowish-gray, with a shade of light brown ; below, entirely white ; feet and tail white. Ears minute, not set in a blackish area ; end of snout blackish. Bridger's Pass, R. Mts. 2. CLUSIUS, *n. s.*

1. **Thomomys talpoides** (Rich.), Baird.

Cricetus talpoides,[1] Rich., Zool. Journ. iii. App. 1828, 518.
Geomys talpoides, Rich., F. B. A. i. 1829, 204.
Saccophorus talpoides, Fisch., Syn. 1829, 588 (marked "388"). (Compiled.)
Ascomys talpoides, Wagn., Suppl. Schreb. iii. 1843, 390. (Compiled.)
Pseudostoma talpoides, A. and B., Q. N. A. iii. 1853, 43, pl. 110. (Compiled.)
Geomys (*Thomomys*) *talpoides*, Gieb., Säug. 1855, 530. (Compiled.)
Thomomys talpoides, Baird, M. N. A. 1857, 403. (Compiled.)
Geomys borealis, "Rich.," Bach., Journ. Phila. Acad. 1839, 103.
Ascomys borealis, Wagn., Suppl. Schreb. iii. 1843, 391. (Compiled.)
Saccophorus borealis, Gray, List Mamm. Br. Mus. 1843, 149. (Mere mention.)
Pseudostoma borealis, A. and B., Q. N. A. iii. 1853, 198, pl. 142.
Thomomys borealis, Baird, M. N. A. 1857, 396, pl. 22, figs. 2 a–e.
Geomys townsendii, Bach., Journ. Phila. Acad. 1839, 105.
Ascomys townsendii, Wagn., Suppl. Schreb. iii. 1843, 391. (Compiled.)
Thomomys rufescens, Maxim., N. Act. Ac. C. L. xix. 1839, 383.—Bd. M. N. A. 1857, 397.
Ascomys rufescens, Wagn., Suppl. Schreb. iii. 1843, 387. (Compiled.)
Geomys rufescens, Le C., these Proceedings, 1852, 161.
Geomys (*Thomomys*) *rufescens*, Gieb., Säug. 1855, 530.
Thomomys "*fulvus*," Merr., U. S. Geol. Surv. Terr. for 1872, 1873, 665, *lapsu.*
"*Geomys unisulcatus*, Gray, Mus. Brit."

Char. mediocr. Coloration almost exactly like that of the house rat, *Mus decumanus ;* sometimes assuming a more reddish phase, occasionally blackish-plumbeous ; tail and feet white, and

[1] Although this name is of frequent occurrence in the books, no author has hitherto identified it ; all the accounts are compiled. The only advance upon Richardson's original description is Audubon's figure of the type specimen.

much of the chin, throat, and breast also white in irregular patches, where the fur is white to the base. No sooty blackish about the mouth-parts; no obvious distinction in color between the pouch and its surroundings; no strongly pronounced reddish-brown on the under parts. General tone of coloration not decidedly tawny. Ears set in a small blackish area. Length 6–8 inches; tail 3 inches or less, decidedly less than half the length of the head and body. Fore and hind feet, claws included, approximately equal to each other, about 1.25; longest fore claw little less than the length of the rest of the hand, about 0.50.

(*Obs.* The foregoing are the average subspecific characters of this geographical race as distinguished from the next, with which it intergrades.)

Hab. Supposed to occur in the interior of North America from "Hudson's Bay" to the "Columbia River," and to occupy about the northern half of the United States west of the Mississippi, exclusive of the Pacific coast region—being replaced there by *T. bulbivorus*, and to the south by *T. umbrinus*. (Specimens examined from the Assiniboine country; from Selkirk Settlement; from Minnesota westward along the parallel of 49° N. to the Rocky Mountains; and from Idaho, Wyoming, Utah, and Nevada.)

1*a*. **Thomomys talpoides bulbivorus** (Rich.), Coues.

Diplostoma? bulbivorum, Rich., F. B. A. i. 1829, 206, pl. 18 B. (Lettered "douglasii.")

Ascomys bulbivorus, Wagn., Suppl. Schreb. iii. 1843, 387. (Compiled.)

Geomys bulbivorus, Lec., these Proceedings, 1852, 162. (Compiled.)

Pseudostoma bulbivorum, A. & B., Q. N. A. iii. 1854, 337. (Compiled.)

Geomys (*Thomomys*) *bulbivorus*, Gieb., Säug. 1855, 530. (Compiled.)

Thomomys bulbivorus, Baird, M. N. A. 1857, 389, pl. 50, f. 3 a–g, pl. 52, f. 1 a–g.

Geomys douglasii, Rich., F. B. A. i. 1829, 200, pl. 18 C, f. 1–6.

Ascomys douglasii, Wagn., Suppl. Schreb. iii. 1843, 392. (Compiled.)

Pseudostoma douglasii, Aud. & Bach. Q. N. A. iii. 1853, 24, pl. 105.

Geomys (*Thomomys*) *douglasi*, Gieb., Säug. 1855, 531. (Compiled.)

Thomomys douglassii, Bd. M. N. A. 1857, 394.

Oryctomys (*Saccophorus*) *bottæ*, Eyd. & Gerv., Mag. Zool. vi. 1836, 23, pl. 21, f. 4.

Thomomys bottæ, Less., Nouv. R. An. 1842, 119. (Compiled.)

Geomys fuliginosus, Schinz, Syn. ii. 1845, 136. (Mere change of name.)

Thomomys laticeps, Baird, these Proc. 1855, 335; M. N. A. 1857, 392.

Char. mediocr. Coloration stronger than in the foregoing—general cast reddish-brown, lined with dusky on the back, the head usually darker than the rest of the upper parts; on the sides the color giving way to a clearer tawny-brown, which also occupies the belly, there overlying the plumbeous roots of the hairs as a strong wash. Face and mouth parts dusky, or even sooty, blackish, contrasting with the white lining of the cheek pouches. No pure white on the under parts. Tail and feet usually incompletely whitish, or quite dusky. If anything, averaging rather larger than true *talpoides*. Hand rather shorter than the foot, owing to less development of the claws, the longest of which is only about 0.40 long.

Hab. Pacific slopes and coast of the United States from Washington Territory to Southern California. In the north shades directly through "*douglasii*" into typical *talpoides*, and in the opposite direction intergrades completely with *umbrinus*.

1*b*. **Thomomys talpoides umbrinus** (Rich.), Coues.

Geomys umbrinus, Rich., F. B. A. i. 1829, 202. ("Louisiana.")
Ascomys umbrinus, Wagn., Suppl. Schreb. iii. 1843, 389. (Compiled.)
Pseudostoma umbrinus, A. & B., Q. N. A. iii. 1854, 307. (Compiled.)
Geomys (*Thomomys*) *umbrinus*, Gieb., Säug. 1855, 530. (Compiled.)
Thomomys umbrinus, Bd., M. N. A. 1857, 399.
Geomys fulvus, Woodh., these Proceedings, 1852, 201.
Pseudostoma (*Geomys*) *fulvus*, A. & B., Q. N. A. iii. 1854, 300. (Compiled.)
Thomomys fulvus, Bd., M. N. A. 1855, 402.

Char. mediocr. Averaging decidedly smaller than either of the foregoing. Length of head and body little over six inches. Forefeet averaging decidedly less than the hind feet; longest claw oftener under than over 0.40. Color varying from a nearly uniform rich fulvous, or even intense reddish-chestnut, to various tawny-brown shades, with or without a blackish dorsal area. Belly usually merely a paler shade of the color of the upper parts, or much as described under *bulbivorus*. Occasionally quite gray, as a typical *talpoides*. (Varies also to a lustrous coal-black all over.) Mouth parts and often whole face blackish, except sometimes just around the mouth, sharply contrasting with pure white lining of the pouches. Tail usually not white.

Hab. S. Colorado, S. Utah, S. Nevada, W. Texas, all of New Mexico, Arizona, and Lower California to Cape St. Lucas. Southward extension into Mexico undetermined. "Louisiana."

2. **Thomomys clusius,**[1] Coues, n. s.

Char. Spec. Smallest known species of the genus; length of an adult ♀ about 5 inches. Feet remarkably small; sole 0.75; palm, including longest claw, 0.65. Fore-claws small, little curved, the longest under 0.30. Tail extremely short; under 1.50 in length from the true base, and little over 1.00 from the end of the conical enlargement at base, the scant-haired portion being thus less than one-fourth of the total length of head and body. Ears minute. Color above pale yellowish-gray, with a slight brown shade, the fur plumbeous at base as usual. Below, nearly pure white to the very base of the fur. No dark auricular area. Feet and tail white. Extremity of snout blackish.

Hab. Type No. 3051, Mus. Smiths. Inst., Bridger's Pass, Rocky Mountains, July 21, 1857, Dr. W. A. Hammond.

[1] Name given in allusion to the characteristic habit of animals of this family, of plugging up the entrances to their subterranean tunnels.